

The background is a solid teal color. Overlaid on this are several thin, white circuit-like lines that branch out from the left and right edges towards the center. In the center of the slide, there is a faint, light-colored silhouette of a human brain.

# STROKE 2020

WENTWORTH-DOUGLASS HOSPITAL

CATHY DANFORTH MS, RN , CNL

CLINICAL NURSE LEADER, STROKE AND SEPSIS PROGRAMS

# CONFIDENTIALITY AND DISCLOSURES

- Quality assurance protected, used for process improvement.
- I do not have any financial disclosures.
- Will discuss off-label use of Alteplase



# IMPACT OF STROKE

- Stroke is the **5<sup>th</sup> leading cause of death** in the United States (CDC, 2015).
- Stroke is the **5<sup>th</sup> leading cause of death** here in New Hampshire (DHHS, 2013)
- Stroke is the **leading cause of adult disability** (CDC, 2015).

# EMERGENCY STROKE THERAPY

- Ischemic stroke is a common and serious disease
  - Potential for death or severe incapacity
  - Affects patient and family
- An approved therapy of proven value is available
  - Intravenous thrombolysis within 3 hours is approved by the FDA
- Success is linked to early treatment
- Guidelines provide recommendations for care
  - Improve safety and efficacy of treatment
  - Failure to follow ...

# TARGET STROKE –PHASE III

- AHA/ASA GWTG-

## TARGET: STROKE PHASE III NATIONAL GOALS

### PRIMARY GOALS:

- Achieve door-to-needle times within 60 minutes in 85% or more of acute ischemic stroke patients treated with IV thrombolytics
- Achieve **door-to-device** times (arrival to first pass of **thrombectomy** device) in 50% or more of eligible acute ischemic stroke patients within 90 minutes (for direct arriving patients) and within 60 minutes (for transfer patients) treated with endovascular therapy (EVT)

### SECONDARY GOALS:

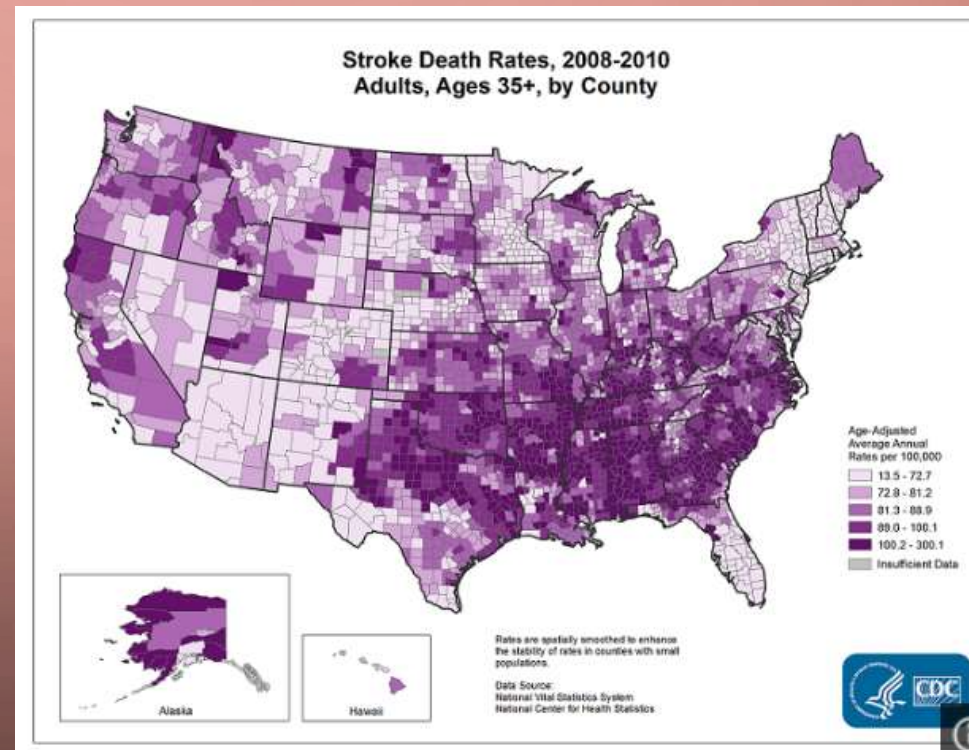
- Achieve door-to-needle times within 45 minutes in 75% or more of acute ischemic stroke patients treated with IV thrombolytics
- Achieve door-to-needle times within 30 minutes in 50% or more of acute ischemic stroke patients treated with IV thrombolytics





# STROKE SYSTEMS AND CENTERS

- US News: 1 in 3 Americans Lives an Hour or More From a Stroke Center (March 2015)
- Stroke Belt: “The death rates from stroke in these 11 states are 10% higher than the national average” (AACN, 2015).
- Image: CDC



# PRE-HOSPITAL MANAGEMENT

- Assess and manage ABCs
- Initiate cardiac monitoring
- Provide O<sub>2</sub> to maintain O<sub>2</sub> saturation > 94%
- Establish IV access with saline
  - Do not give excess volume of fluid
  - Do not administer glucose-containing fluids unless patient has hypoglycemia
- Check blood glucose and treat accordingly
- Determine Last Known Normal (LKN)

• Powers, et al, Stroke, 2019

# NOT RECOMMENDED PRE-HOSPITAL

- Intervention for hypertension- only if directed by medical command
- Excess IV fluids
- Dextrose containing fluids in nonhypoglycemic patients
  - Cerebral edema
- Oral medications
  - Aspiration risk!
  - No ASA
- Any delay in transport for prehospital interventions.



# LAST KNOWN WELL TIMES

- The **Symptom Discovery** time is not necessarily the patient's **Last Known Well** time.
- Acute stroke treatment is based on the patient's Last Known Well time.
- Establishing an accurate LKW is harder than you think
- Wake up with symptoms
  - Who did they see or talk to last, did they get up during night
- Dig, Dig, Dig!
  - Time the store opened, what was the time of the TV show, last call/text, when did they last speak to someone, time of appointment...

# LAST KNOWN WELL TIMES

- Complicating factors
  - Patients “seemed off”
  - They had transient symptoms prior to fixed deficit
  - Hemineglect: patients pay no attention to problem
  - Anosagnosia: patients deny they have a problem

# NEUROLOGICAL ASSESSMENT

- Initial Neuro Assessment-Identify deficits
- Neuro Re-assessment- every 15 minutes
- Observe for waxing and waning symptoms
  - If symptoms completely resolve and then return, start the clock again.
- Keep NPO until evaluate ability to swallow with screening
- VS- every 15 minutes
- Presentation with acute stroke-like symptoms is a neurological emergency.

# EMERGENCY DIAGNOSTIC STUDIES

- Brain imaging\*\*\*
  - May be either CT or MRI
  - CT generally more readily available, quick, non-invasive, and relatively inexpensive
  - Gives key information for emergency care
- Serum glucose\*\*\*
- INR and aPTT
- Complete blood count and platelet count, Cardiac enzymes, renal studies
- Electrocardiogram
- Pulse oximetry
- \*\*\* Results must be known before treating with alteplase

# Emergency Management of Stroke: Workflow

Signs/Symptoms of Stroke with LKW less than or equal to 4.5 hours- **Potential tPA & Thrombectomy**

Signs/Symptoms of Stroke with LKW up to 24 hours - **Potential Thrombectomy**

EMS	Walk-In
Charge Nurse: If notified PTA by EMS Overhead Page: Stroke Team Activation or call on arrival of patient Confirm VS and FSBS result	Triage Nurse: Transport patient via WC to ED; Overhead Page: Stroke Team Activation Obtain VS Obtain FSBS
Pause briefly in hallway for Physician /Provider assessment of ABCs and Stroke severity <u>Goal:</u> Avoid going to ED room unless unstable	Pause briefly in hallway for Physician /Provider assessment of ABCs and Stroke severity <u>Goal:</u> Avoid going to ED room unless unstable
Patient Access obtains registration information	Patient Access obtains registration information



Primary Nurse: Continue to CT scan room with patient

- Support staff in ED: set up TeleStroke machine

Have lab staff draw labs in CT, or hand off labs drawn by EMS

Move patient to CT table- use EMS monitor to obtain VS if hot stretcher

CT staff: Perform CT imaging

Radiologist reads CT scan and notifies ED physician with results- if CTA ordered, patient to remain in CT until read complete

If CT negative for hemorrhage, and CTA ordered, perform CTA

In between CT and CTA, place on WDH monitor

Obtain as much history as possible, if potential candidate for tPA, call ED to mix tPA.

Move patient to ED stretcher; obtain patient weight and call to ED

Return to ED

In collaboration with ED physician - Call for Consult with TeleStroke neurologist at MGH via TeleStroke machine

- Start line if not already done;
- Calculate tPA dose

Perform NIHSS w/ MGH neurologist

Administer tPA if patient eligible



# TIME TRACKER

## Stroke Activation Time Tracker

- ☐ VS Q15" x 8
- ☐ NVS Q15" x 8
- ☐ NIHSS documented
- ☐ Dysphagia Screen before PO
- ☐ Temp Q4h

Target Time  
Goals:

Document  
Last Known  
Well in EDIS

Within 15 mins  
of arrival

Within 45 mins  
of arrival

Within 45 mins  
of arrival

Within 45 mins of  
Arrival  
(Draw ASAP)

TPA administered  
within 60 mins of arrival

	Goal:	Goal:	Goal:	Goal:	Goal:	Goal:
Arrival Time	Seen By Provider	CT Interpreted	EKG Completed	Labs Resulted	TPA Decision	TPA Initiated
Time:	Time:	Time: Use time in Soarian	Time:	Time: Use time in Soarian	Time:	Time:

Printed RN Name

RN Signature

Date/Time

Printed Physician Name

Physician Signature

Date/Time

# TELESTROKE CONSULT

- Neurologist stroke specialty
- Collaborate on decision for t-PA
- Perform NIHSS
- Calculate dose w/ staff
- Provide guidance on management of BP

# MANAGEMENT OF ARTERIAL HYPERTENSION

- Blood pressure elevations are common –underlying risk factor, stress, physiological response for perfusion
- Aggressive lowering of blood pressure is not recommended because of risk of worsening of stroke
- Need to lower blood pressure to treat with Alteplase
- Usually recommend IV administration of short-acting medications
  - Labetalol, nicardipine,

# INTRAVENOUS THROMBOLYSIS

- Approved medical therapy for treatment of carefully selected patients with acute ischemic stroke
  - FDA approved for treatment < 3 hours
  - ASA/AHA Guidelines for treatment < 4.5 hours
- Improve neurological outcomes
- Efficacy is time-linked
- Careful patient selection is key to minimize hemorrhage

# ALTEPLASE (MORE COMMONLY KNOWN AS T-PA)

- Works by stimulating the body's own clot dissolving mechanism by activating plasminogen, a naturally occurring substance secreted by endothelial cells in response to injury to the arterial walls that contribute to clot formation.

# ABSOLUTE CONTRAINDICATIONS

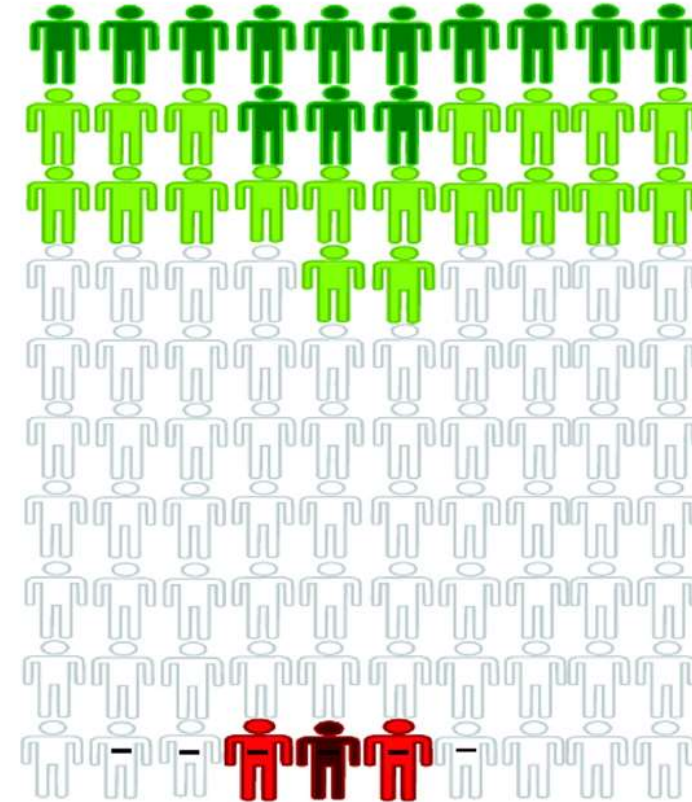
- LKN >4.5h ( 3-4.5h additional considerations)
- History of intracranial hemorrhage
- Platelets <100,000
- INR >1.7
- Heparin in prior 48h and elevated aPTT
- LMWH in prior 24h
- Direct oral anticoagulant use **in prior 48h**
- Uncontrolled hypertension (not responding to a drip)
- Uncontrolled hypoglycemia
- Stroke or severe head trauma within 3 months.



# RISK OF BLEEDING

- 1 in 3 patients who receive t-PA improve
- 6 of 100 have bleeding, among whom 1 has death or a serious disability

TPA for Cerebral Ischemia within 3 Hours of Onset-Changes in Outcome Due to Treatment



Changes in final outcome as a result of treatment:

- Normal or nearly normal
- Better
- No major change
- Worse
- Severely disabled or dead

Early course:

- No early worsening with brain bleeding
- Early worsening with brain bleeding

# SOME STROKE MIMICS:

- Hypoglycemia
- Metabolic Disturbances
- ETOH/Drug Intoxication
  - Caution- don't let this be a distraction , especially in younger population
- Postictal Hemiparesis (Todd's Paralysis)
- Cerebral Infections
- Drug Toxicity
- Migraines
- Bell's Palsy
- Hypertensive Encephalopathy
- Epidural Hematomas
  - Literature shows very low risk of bleeding in patients that receive t-PA and have not had a stroke

# AHA/ASA GUIDELINES-UPDATE

## **IV t-PA in 3-4.5 Hour Window: Relative Exclusion Criteria that should be considered in addition to the previously listed criteria**

- **Age >80 years** *[Reasonable to consider treatment in those over age 80 since recent evidence of Class IIa level suggests no clear increased risk of worse outcomes due to t-PA]*
- **Severe stroke (NIHSS>25)**
- **Taking a non-warfarin oral anticoagulant regardless of time since LKW**; safety has not been established. *[If taking warfarin and  $INR \leq 1.7$ , IV t-PA is shown to be safe and beneficial per Class IIb evidence.]*
- **History of both diabetes and prior ischemic stroke** *[Reasonable to consider treatment in those with both diabetes and prior ischemic stroke with recent Class IIb evidence suggesting no clear increased risk of worse outcomes due to t-PA treatment]*

*These criteria are based on the recommendations listed in the AHA/ASA 2018 Guidelines for Early Management of Patients with Acute Ischemic Stroke*

# ADMINISTRATION CONSIDERATIONS

- Who mixes? When do you mix?
- Perform any necessary invasive procedure prior to initiating infusion- 2<sup>nd</sup> IV,
- Programmable Pump with drug library
- Double check
- Remove discard dose from vial
- Bolus administer over 1 minute
- Infusion via pump over 60 minutes
- Monitor Q15 minutes during infusion
  - NIHSS 2 hours after infusion
  - CCU for 24 hours post infusion
- IV Infusion Tubing volume
  - Ensure fluid available for **IV tubing flush for transfer** of patient to next level of care

# CALCULATOR

## t-PA Dosing Calculator

<http://www.massgeneral.org/stopstroke/providers/?display=dosing-calculator>

### t-PA Dosing Calculator

Prior to making any medical decisions, please view our [disclaimer](#).

Use this calculator to determine tPA dosing information.

Enter the Weight:

iv t-PA Dosing calculator		
Item	Value	Calculation description
Patient weight (lbs)	171.6 lbs	
Patient weight (kg)	78 kg	
Total iv t-PA Dose	70.2 mg	total dose = 0.9 mg per kg of weight
Bolus Dose	7 mg	bolus dose = 10% of the total dose
Bolus Dose	7 ml	mixed in a 1 mg/ml solution
Discard Dose	29.8 mg	Remove from bottle. Not for infusion.
Infusion Dose	63.2 mg	Remainder of dose after bolus given.
Infusion Rate	63.2 ml/hr	



# COMPLICATIONS

- Symptomatic Intracranial Hemorrhage
- Severe headache, acute hypertension, nausea or vomiting or worsening neurological examination
  - Stop t-PA
  - Emergent CT
  - Reversal- cryoprecipitate, Tranexamic acid
  - Neurosurgical consult- transfer



# HYPERSENSITIVITY

- Urticarial/anaphylactic reactions
  - Angioedema observed during and up to 2 hours after infusion
  - Orolingual edema



# QI-OUTCOMES

- Monitor process and turn-around times
- Set goals based on evidence-based guidelines
- Recognize both process improvement and goal achievement
- Involve multi-disciplinary team
  - Keep it simple
- Evaluate patient outcomes
  - Modified Rankin score
  - Return to prior functional level
  - Disabilities- aphasia, cognitive linguistic

# CASE STUDY 1

- 49 y.o F with sudden onset expressive aphasia witnessed by co-worker. Called 911 and brought to nearest ED.
- LKW was clear.
- Hot Stretcher to CT after brief assessment by ED physician- noted L UE/LE weakness
- On return to ED, R gaze deviation, L arm paralysis, decreased LOC. CTA showed R M1 occlusion.
- Review of history and medications- no contraindications to t-PA
- TeleStroke consult- decision to administer t-PA. 48 minutes door to needle.
- Med flight to AMC
- Thrombectomy successfully performed
- 3 months post- mRs -1

## CASE STUDY 2

- 91 y.o. F , husband noted slurred speech and difficulty with word finding. Brought in by private vehicle.
- Hot Wheelchair to CT after brief assessment by ED physician.
- LKW vague on arrival- required significant interviewing to establish- determined was 90 minutes PTA.
- History and medication review – no contraindications
- TeleStroke consult- time spent confirming LKW
- Decision to administer t-PA. Door to needle was 89 minutes.
- 3 months post- mRs 1, continues with mild dysarthria

# FUTURE OF STROKE/TRAUMA?



# REFERENCES

- Powers WJ, Rabinstein AA, Ackerson T, Adeoye OM, Bambakidis NC, Becker K, Biller J, Brown M, Demaerschalk BM, Hoh B, Jauch EC, Kidwell CS, Leslie-Mazwi TM, Ovbiagele B, Scott PA, Sheth KN, Southerland AM, Summers DV, Tirschwell DL; on behalf of the American Heart Association Stroke Council. Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2019;50



## Alteplase (t-PA) Dosing

Calculate the exact dose of t-PA using the [t-PA Dosing Calculator](#) based on the patient's actual weight (preferred).

- ☐ Verify the bolus dose, infusion dose and discard dose with second RN/Paramedic/Pharmacist
- ☐ Reconstitute the vial of t-PA with the supplied preservative-free water
- ☐ Remove flip-caps from t-PA and sterile water vials
- ☐ Swab both vial tops with alcohol prep pads
- ☐ Insert spike transfer device into sterile water
- ☐ Turn t-PA (lyophilized cake) vial upside down, position over the transfer device and push down.
- ☐ Invert the 2 vials allowing the sterile water to mix with the t-PA powder
- ☐ Remove sterile water vial (with transfer device)
- ☐ Gently swirl t-PA to dissolve powder (approximately 1 minute). DO NOT SHAKE.
- ☐ Fill out label and affix to t-PA bottle.
- ☐ Insert IV pump tubing with 3-way stopcock attached to end into t-PA vial.
- ☐ Prime IV tubing.
- ☐ Attach 10 ml syringe at stopcock. Withdraw bolus dose; fill out label and affix to bolus dose syringe.
- ☐ Attach 60ml syringe at stopcock. Withdraw discard dose; fill out label and affix to discard dose syringe.
- ☐ Place t-PA on infusion pump
- ☐ Program pump for amount of infusion.
- ☐ Administer bolus dose over 1 minute.
- ☐ Initiate infusion. Administer Iv t-PA infusion over one hour after bolus has been given. When pump alarms "infusion complete", ensure all t-PA has been infused from the bottle.
- ☐ Remove t-PA vial and hang 50ml NS bag.
- ☐ Program NS infusion amount for 50ml. Infuse at same rate as t-PA.